2023UECM2453OE5

Start again

Review of preview

Started on	Tuesday, 25 April 2023, 08:41 PM
Completed on	Tuesday, 25 April 2023, 08:42 PM
Time taken	12 secs
Grade	**0** out of a maximum of 20 (**0**%)

1

Marks: 2

The price of a stock is to be estimated using simulation. It is known that:

- The time-t stock price, S(t), follows the lognormal distribution:

$$\ln S(t)/S(0) \sim N(\alpha-\sigma^2/2)t,\sigma^2 t)$$

- S(0) = 60, α = 0.2, and σ = 0.22.

The following are three uniform (0, 1) random numbers

0.9187, 0.0384, 0.7967

Use each of these three numbers to simulate a time-2 stock price. Calculate the mean of the three simulated prices. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 97.14

Marks for this submission: 0/2.

2

Marks: 2

Assume the Black-Scholes framework for a nondividend-paying stock. You are given that

- The current stock price is 35.
- The expected rate of appreciation is 24%.
- The stock's volatility is 21%.

using the following three uniform random numbers, simulate the payoff from a geometric average strike option:

0.5115, 0.0642, 0.8882

_____

Answer:

Make comment or override grade

Incorrect
Correct answer: 3.3273

Marks for this submission: 0/2.

3

Marks: 2

Assume the Black-Scholes framework for a nondividend-paying stock. You are given

- The current stock price is 47.
- The stock's volatility is 31%.
- The continuously compunded risk-free interest rate is 10%.

You estimate the price of a 45-strike 1-year call on the stock. Using the following 6 uniform random numbers arranged in ascending order

0.1157, 0.14, 0.3783, 0.5671, 0.6994, 0.8512

Estimate the price of the European call using Monte-Carlo simulation. _____

Answer: ✗

Make comment or override grade

Incorrect
Correct answer: 6.5888
Marks for this submission: 0/2.

4
Marks: 2

You are given the following regarding dollars and pounds:

- The dollars/pounds exchange rate follows the Black-Scholes framework.
- The spot exchange rate is $1.42/pounds.
- The continuously compounded risk-free rate for dollars is 0.03.
- The continuously compounded risk-free rate for pounds is 0.1.
- The volatility of the exchange rate between the two currencies is 0.12.

A dollar-denominated Asian arithmetic average strike put option on pounds has a payoff has a payoff based on the average exchange rate at the end of each of four months from the date of purchase. The price of the option is calculated using naive Monte Carlo valuation. Using the following standard normal random numbers for one trial:

-0.26, 0.08, 0.18, -1.02

Determine the value of the option in this trial. _____

Answer: ✗

Make comment or override grade

Incorrect
Correct answer: 0.0437
Marks for this submission: 0/2.

5
Marks: 2

Suppose that S(0) = 9, δ = 0.03, σ = 0.4, r = 0.07. You obtained the following 6 uniform random numbers:

0.1023, 0.5046, 0.2411, 0.9547, 0.6743, 0.7859

Estimate the price of an ATM 6-month European put on S by using Monte-Carlo simulation. Apply the stratified sampling method to the random numbers so that U_i and U_{i+3} are transformed to random numbers V_i and V_{i+3} that are uniformly distributed over the interval [(i-1)/3, i/3], i=1, 2, 3. _____

Answer: ✗

Make comment or override grade

Incorrect
Correct answer: 0.834
Marks for this submission: 0/2.

6
Marks: 2

Assume the Black-Scholes framework for a nondividend-paying stock. You are given

- The current stock price is 41.
- The stock's volatility is 29%.
- The continuously compunded risk-free interest rate is 9%.

You estimate the price of a 40-strike 1-year call on the stock. Using the following 6 uniform random numbers arranged in ascending order

0.6946, 0.5458, 0.334, 0.1486, 0.8604, 0.1299

Estimate the price of the European call using the antithetic variate method. _____

Answer: ✗

Make comment or override grade

Incorrect
Correct answer: 6.19645
Marks for this submission: 0/2.

7
Marks: 2

You are to perform one trial of a simulation to estimate the price of an arithmetic average price Asian call option using the control variate method. The option pays the excess over 70, if any, of the arithmetic average of the prices of stock at the end of three consecutive months. You are given:

- The current stock price is 70.
- The continuously compounded expected rate of return from the stock is 0.22.
- The stock pays no dividends.
- The continuously compounded risk-free interest rate is 0.05.

- The volatility of the stock is 0.31.
- The following standard normal random numbers are 2.0, 0.5, -2.0.

The closed form formula for geometric average price Asian call option for the same stock over the same period with the same strike price calculates a price of 3.319 for this option. Calculate the simulated price of arithmetic average price option in this trial. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 3.5476
Marks for this submission: 0/2.

8
Marks: 2

Let C(K) denote the Black-Scholes price for a 1-year K-strike European call option on a nondividend-paying stock.
Let $\hat{C}(K)$ denote the Monte Carlo price for a 1-year K-strike European call option on the stock, calculated by using 10 random 1-year stock prices simulated under the risk neutral probability measure.
Suppose that S(0) = 20, δ = 0, σ = 0.2, and r = 0.09. Alan knows that the Black-Scholes price of a 1-year 21-strike European call on S is 1.9971 but he does not know the Black-Scholes formula. To find the price of a 1-year 22-strike call on S, he simulates 10 stock prices after 1 year under the risk-neutral measure using the following numbers drawn from a standard normal distribution:

0.5133, -2.3421, 1.3789, 0.9535, 0.1659
1.2695, -1.7836, -1.2172, -0.3542, -0.3147

He estimates the price of a 1-year 22-strike European call option on the stock using the formula

$$C^*(22)= \hat{C}(22) + \beta [C(21)-\hat{C}(21)],$$

where the coefficient β is such that the variance of $C^*(22)$ is minimized. Obtain the control variate estimates of the price of the 22-strike call. _____

The beta in this question need to use all 10 pairs of abservations.

Answer:

The beta calculation that I showed in class by deleting the o's were not correct

Make comment or override grade

Incorrect
Correct answer: 1.5529
Marks for this submission: 0/2.

9
Marks: 4

Click the following link to answer the questions:
https://docs.google.com/forms/d/e/1FAIpQLSeNzks-kO725Enx8mvy7UpauhL1XJuyFber2Lv_dI4i0ykcKA/viewform?usp=sf_link
Then answer 1 here after submitting the form.
[Note: In order to enter the google form, you must make sure that you login to UTAR acccount. If you see "You need permission", this means that your are not login to UTAR account, switch to UTAR account] _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 1
Marks for this submission: 0/4.